

NEW SPECIES AND NOMENCLATURAL CHANGES IN MEXICAN *TILLANDSIA* - I

C. S. Gardner*

Recent field studies and the examination of living specimens of members of *Tillandsia* subgenus *Tillandsia* (Bromeliaceae) have resulted in the discovery of several previously undescribed species. In other cases, new information suggests the need for revisions in nomenclatural status of previously described taxa. This paper is the first of a series in which new species and nomenclatural changes will be presented.

Tillandsia agascalientensis C. S. Gardner, sp. nov.

Figure 1

Tillandsiae dugesii Baker affinis, sed per ramulos floriferos strictos atque bracteas florum nervosas politasque autem ad apices atque secus margines lepitotos distinguibilis.

Rosette funnel-form, leaves 25-30, offsetting freely. Leaf 41-54 cm long, the blade 25-50 mm wide, narrowly triangular, canaliculate, cinereous-lepidote adaxially and abaxially, nerved (dry). Leaf sheath 7-12 cm long, 4-7 cm wide, elliptic, narrowing at the union with the blade, pale brown-lepidote abaxially and adaxially. Scape stout, erect, 18-30 cm long. Scape bracts imbricate, concealing the scape; sheath glabrous. No. 26¹ cherry, the blades long, deflexed, gray-green-lepidote (may be flushed maroon). Primary bracts No. 26 cherry, nerved (fresh or dry), sheath glabrous, the recurved blades lepidote. Inflorescence erect, pinnate, 20-40 cm long, the internodes 8-25 mm long. Branches elliptic, 5- to 10-flowered, dorso-ventrally compressed, strict, spreading only 15 to 20 degrees, with 2 or 3 sterile bracts at the base, the lowest often bicarinate. Floral bracts lanceolate, conduplicate, keeled, beaked, No. 26 cherry, with scattered trichomes on the adaxial surface, the abaxial surface distinctly nerved (fresh or dry) especially in the apical half, polished except lepidote on the margins and apices, 39-42 mm long, 15-20 mm wide. Sepals elliptic, strongly keeled posteriorly, connate 1/4 to 1/2 the length, 34-35 mm long, 9-11 mm wide. Petals spatulate, erect, with a slight sinus on each side of the blade, the apex rolled back, No. 47 lavender with white edges, 44-50 mm long, 8-9 mm wide. Filaments with lengths unequal in 2 sets of 3 each, the distal 1/3 flattened, broadened, No. 47 lavender, 51-63 mm long. Anthers 4 mm long, attached 1/3-1/2 of the length from the base, the pollen dark yellow, the endothelium brown. Style white, occasionally with lavender spots below the stigma, 47-58 mm long excluding the ovary. Stigma greenish, the lobes erect, slightly twisted, papillose. Flowering in February-March, morning to early afternoon.

Etymology: Named for the Mexican state of Aguascalientes where the species was discovered.

Type: *MEXICO*: AGUASCALIENTES: saxicolous on rock walls and boulders, alt. 2000-2200 m, 1980, *Gardner 1322* (Holotype: SEL; Isotypes: US, MEXU).

Additional material examined: *MEXICO*: AGUASCALIENTES: Rincón de Ramos, 1980, *Gardner 1324* (SEL).

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¹ Numbers associated with color references refer to color chart in *Exotica* by A. B. Graf, J. Roehrs Company, Rutherford, New Jersey

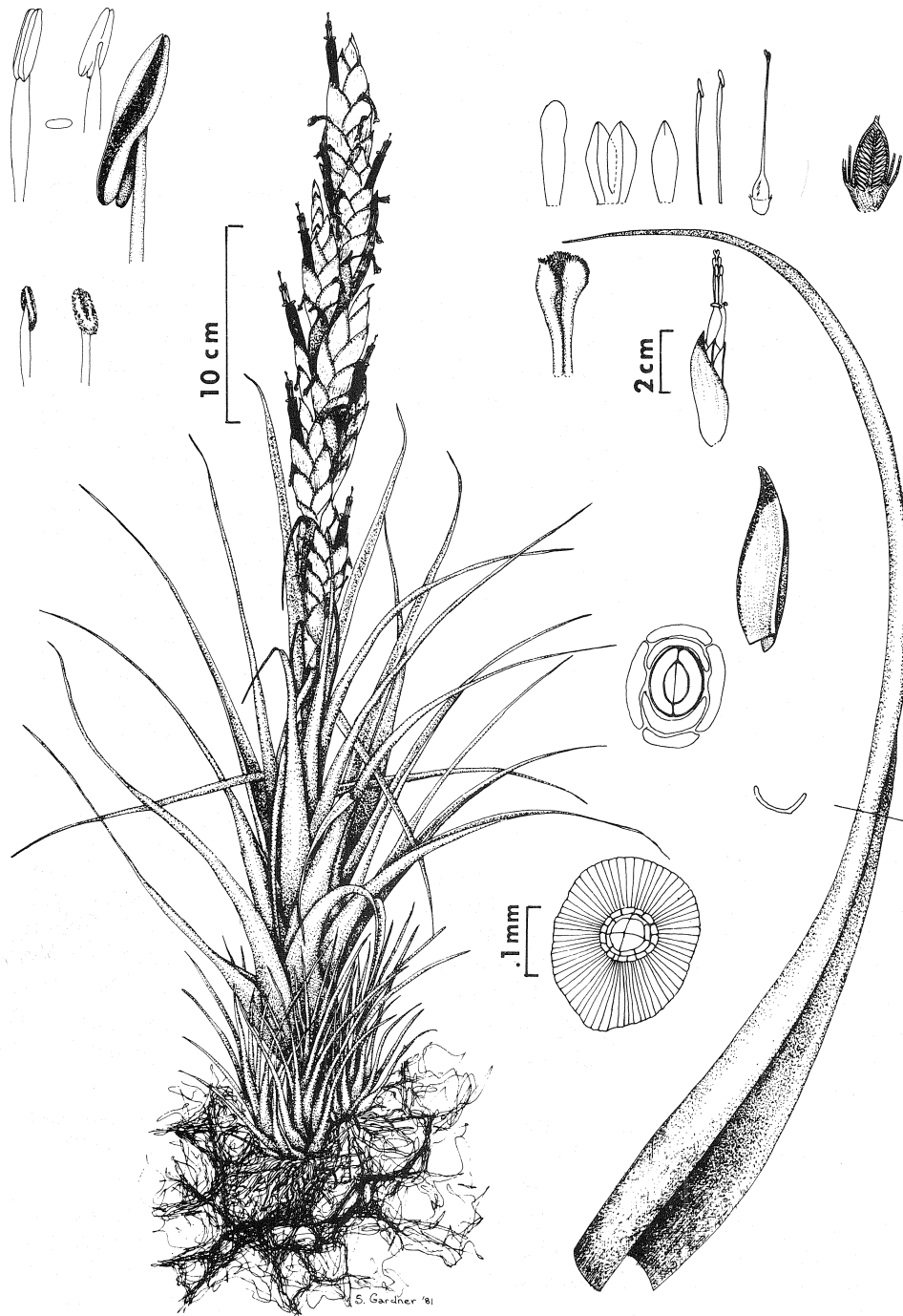


Fig. 1. *Tillandsia agascalientensis* C. S. Gardner

Distribution: Known only from two collections separated by approximately 40 km in the state of Aguascalientes, Mexico.

Tillandsia pseudobaileyi C. S. Gardner, sp. nov.

Figure 2

Tillandsia baileyi auct. non Rose: L. B. Smith & R. J. Downs, *Tillandsioideae in Flora Neotropica*, Monograph No. 14.

Tillandsiae baileyi Rose verosimiliter affinis, per rosulam ampliorem atque magis bulbosam foliorum minute lepidotorum atque inflorescentiam pinnatam differt.

Rosette bulbous with 10-12 leaves, the blades arching, divergent, often contorted, non-water-impounding, with few offsets. Leaf 20-35 cm long, the blade 10-15 mm wide, narrowly triangular, involute, hard, succulent, distinctly nerved (fresh or dry), minutely appressed-lepidote, the leaves particularly the nerves, No. 27 blood-red in bright light. Leaf sheath 4-5 cm long, 5-6 cm wide, inflated, red-brown-lepidote adaxially, basal 1/2 light brown-lepidote, distal 1/2 appressed-lepidote, nerved abaxially. Scape elongate to 15 cm long, wiry, No. 27 blood-red. Scape bracts imbricate with a long, involute lamina, the sheath blood-red, the blades may be green. Primary bracts lanceolate, the apex short, laminate or beaked, lowest less than 1/2 the length of the branch, No. 27 blood-red. Inflorescence pinnate with 2-5 branches, the internodes 5-10 mm long. Branches narrowly lanceolate, 4- to 6-flowered, dorso-ventrally compressed, spreading 40-45 degrees, with a bicarinate, sterile bract at the base. Floral bracts ovate, conduplicate, with a slight keel near the apex, firm, the adaxial surface glabrous with a few trichomes near the apex, the abaxial surface appressed-lepidote, suffused No. 27 blood-red, 17-20 mm long, 9-11 mm wide. Sepals elliptic, free (posterior or all may be slightly connate), posterior slightly to moderately keeled, the adaxial surfaces glabrous, the abaxial surfaces appressed-lepidote, thin and firm, green with red edges, 14-16 mm long, 5-6 mm wide. Petals spatulate, erect, with a slight sinus on each side of the blade, the apex rolled back, 29-32 mm long, 6-8 mm wide, No. 46 lavender. Filaments with lengths unequal in 2 sets of 3 each, the distal 1/3 flattened and broadened, No. 46 lavender, 36-43 mm long. Anthers 2-3 mm long, the attachment 1/3 to 1/2 of the length from the base, the pollen yellow, the endothelium black. Style white (occasionally flushed with lavender near the apex), 29-34 mm long excluding the ovary. Stigma green, the lobes erect, slightly papillose. Flowering January-March, time of day variable.

Etymology: From the Greek *pseudo*-, "false" or "resembling but not equaling," and *baileyi*, the epithet of another species with which it has been confused.

Type: *MEXICO*: CHIAPAS: Ocozocoautla: epiphytic in trees of open, seasonally dry forests, growing horizontally or descending, alt. 300-1000 m, 1979, *Gardner 1118* (Holotype: SEL; Isotypes: US, MEXU, CAS).

Additional material examined: *MEXICO*: NAYARIT: 32 km N of Puerto Vallarta, 1980, *Gardner 1348* (SEL, US); Río Tomatalán, La Cumbre jct. near Jalisco state border, 1980, *Gardner 1355* (SEL, US); CHIAPAS: Ocozocoautla, 1951, *Brooks 101* (US); Cintalapa, 1954, *Van Hynning 543* (US); few kilometers north of the Guatemalan border on Hwy. 190, 1979, *Gardner 1053* (SEL). *HONDURAS*: PARAISO: Oropoli, 1964, *Gilmartin 994* (US). *NICARAGUA*: MATAGALPA: Calabazas, 1969, *Atwood, s.n.* (US).

Distribution: Pacific coast from Nayarit, Mexico, south to Nicaragua.

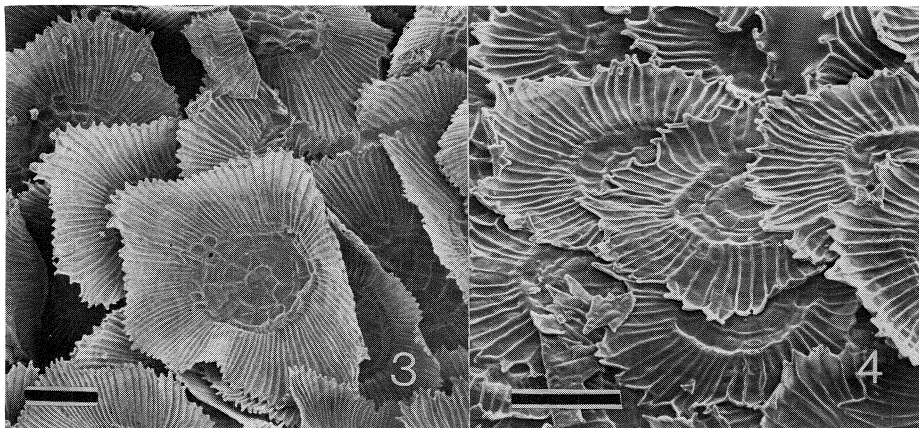


Fig. 2. *Tillandsia pseudobaileyi* C. S. Gardner

This species can easily be distinguished from *T. baileyi* by several characteristics. It has a larger, more bulbous body and harder, nearly glabrous leaves. *Tillandsia baileyi* foliage is gray-lepidote, and its trichome morphology differs (Figs. 3 & 4). The trichome cap of *T. pseudobaileyi* has two rings of cells with 8 and 16 cells respectively encircling the four central cells, and a wing of 32 cells, or a formula of 4-8-16-32. The cell formula of *T. baileyi* trichome is 4-8-16-64. Diameter of the trichome caps of *T. baileyi* is broader, with a sample of five from the mid-abaxial blade averaging 0.35 mm. A similar sample of *T. pseudobaileyi* averaged about 0.25 mm.

Flowering or fruiting specimens are distinguished by inflorescence characters. *Tillandsia baileyi* has a simple spike, and lepidote, pale rose floral bracts. In contrast, *T. pseudobaileyi* typically produces a compound inflorescence of up to five branches. Floral bracts are appressed-lepidote, flushed with blood-red in strong light.

Collections to date indicate that the distributions of the two species differ (Fig. 5). Flowering season also differs, *T. pseudobaileyi* flowers January to March and *T. baileyi* April and May.



Figs. 3 & 4. SEM photographs of trichomes from abaxial leaf blade of *T. baileyi* and *T. pseudobaileyi* respectively. Bar represents 100 μ m.

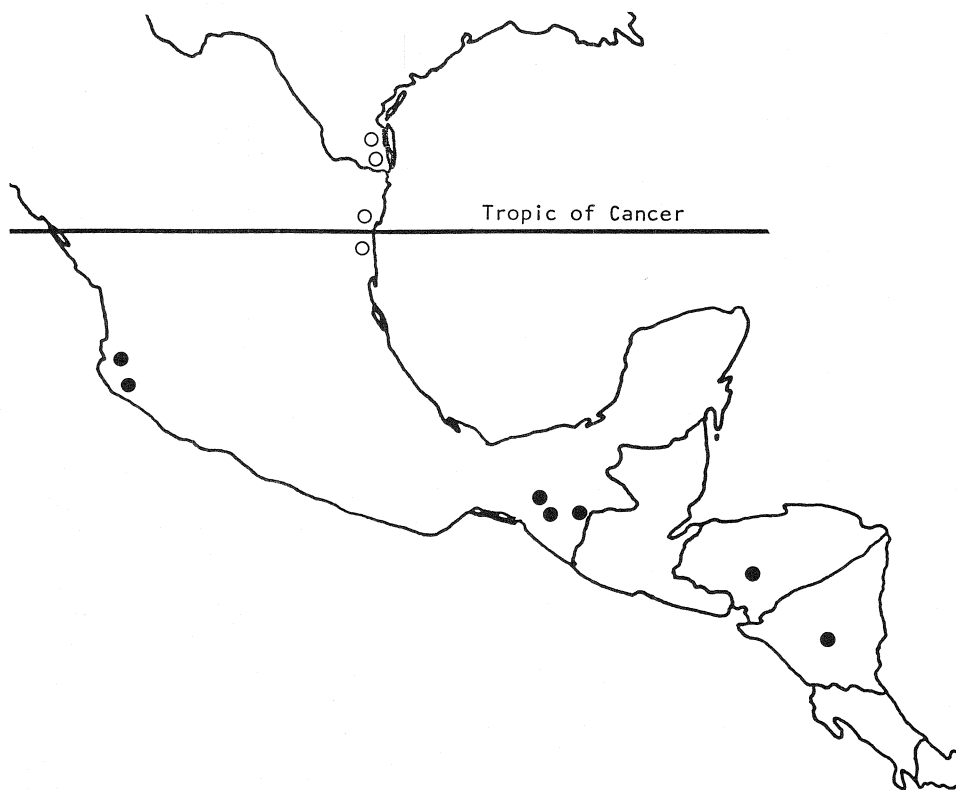


Fig. 5. Distribution of *T. pseudobaileyi* - closed circles, and *T. baileyi* - open circles.

Tillandsia utriculata L. subsp. *pringlei* (Watson) C. S. Gardner, comb. et stat. nov.

Basionym: *Tillandsia pringlei* Watson, Proc. Am. Acad. 26: 155, 1891.

Type: MEXICO: SAN LUIS POTOSI, Las Palmas, *Pringle 3530* (GH).

Tillandsia karwinskyana auct. non Schultes: L. B. Smith & R. J. Downs, *Tillandsioideae in Flora Neotropica*, Monograph No. 14, 1977.

Additional material examined: MEXICO: SAN LUIS POTOSI, 9 mi. S of Cd. Mante, *Kenoyer & Crum 3703* (GH); Las Canoas, 1891, *Pringle 3738* (GH); El Salto Falls, 1961, *Goebel s.n.* (US); 58 km E of San Luis Potosí, 1977, *Gardner 305* (SEL); Hwy. 70, Km 12 E of Cd. Valles, 1980, *Gardner 1184* (SEL). QUERETARO: Hwy. 120, km 246, S of Xilitla, 1980, *Gardner 1185* (SEL). HIDALGO: Puerto de la Zorra, Km 284 NE of Jacala, 1946, *Moore 1682* (GH, US); 1947, *Moore 2658* (GH, US); 1960, *Van Hyning 6068* (US); 1976, *Gardner 5* (US); 1977, *Gardner 4* (US); Hilo Juanico to Barranca Seca, Jacala to Pacula, 1948, *Moore & Wood 3841* (GH, US).

Distribution: Saxicolous on cliffs and boulders of San Luis Potosí, Queretaro, and Hidalgo, Mexico.

Tillandsia pringlei was treated as a synonym of *T. utriculata* by Mez (1935), then transferred to *T. karwinskyana* by Smith (1951). An examination of living material revealed characters not apparent on dried specimens that support Mez's treatment of *T. pringlei* within *T. utriculata*.

Tillandsia utriculata subsp. *utriculata* is a widespread epiphyte of dry, low elevation forests from Florida, through the Caribbean, the Gulf states of Mexico, and Central America into northern South America. Subspecies *pringlei* is a saxicole in east-central Mexico (Fig. 6) at elevations between 100 and 1500 meters. The characters that distinguish it from the typical subspecies are characteristics that are often associated with saxicolous or with xerophytic habitats. Plants in these populations tend to be smaller and less variable in size, and the inflorescences are less highly branched than those in the epiphytic populations. Considerable overlap in these characteristics occurs, however, between the two subspecies (Gardner, 1980). The plants of epiphytic populations are monocarpic, rarely producing offsets after attaining maturity (seedlings often produce basal proliferations) (Benzing and Davidson, 1979; Gardner, 1980, 1983). However, plants in saxicolous populations are polycarpic, forming large clumps (Gardner 1980, 1983). Smith and Downs (1977) used "Leaves covered with coarse cinereous spreading scales, 15-20 cm long; inflorescence few-branched" versus "Leaves covered with minute pale appressed or subappressed scales, to 100 cm long" to separate *T. karwinskyana* from *T. utriculata* and a few other species. According to their description, however, *T. karwinskyana* has "Inflorescence simple or few-branched" and *T. utriculata* "Inflorescence central, amply bi- or tripinnate or rarely simple."

Indumentum, the remaining character distinction, was found useful in distinguishing these species although some variation was found among populations of *T. utriculata*. Specimens from populations at the highest elevations tend to be most densely lepidote. The scurfy gray leaves of the most densely lepidote *T. utriculata*, however, are distinguishable from the tomentose leaves of *T. karwinskyana*. This characteristic is useful in determining dried specimens. Examination of the trichomes under scanning electron microscopy re-

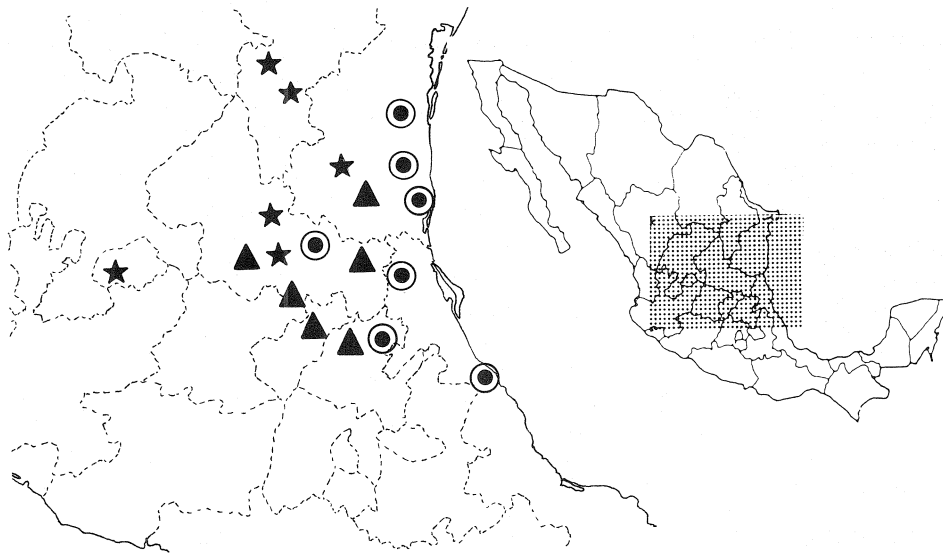
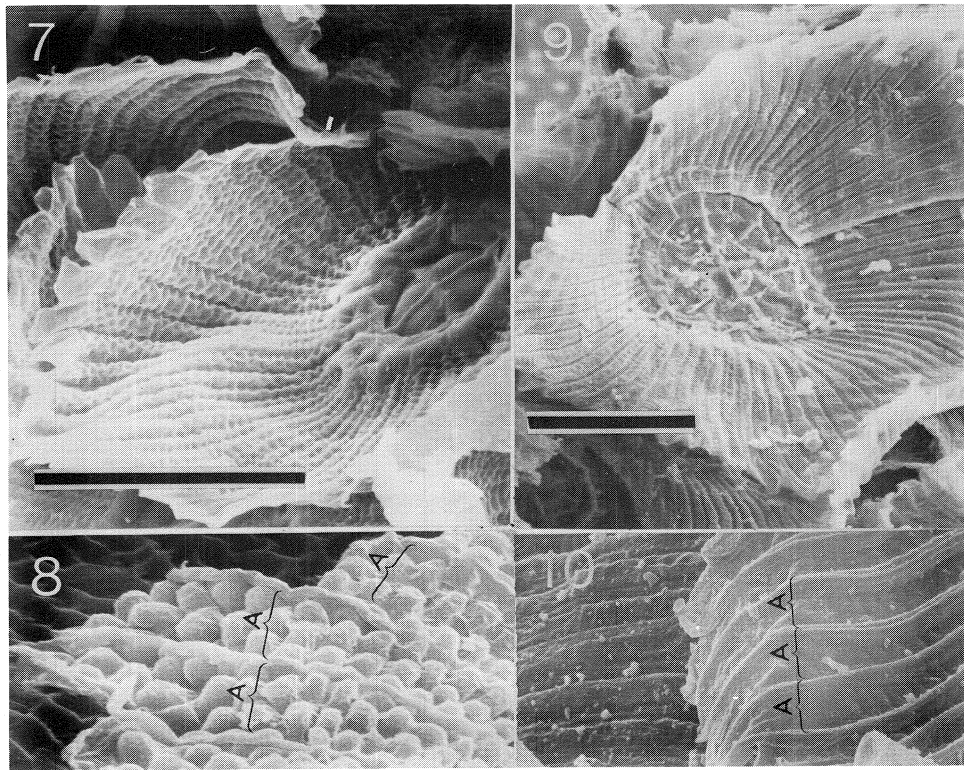
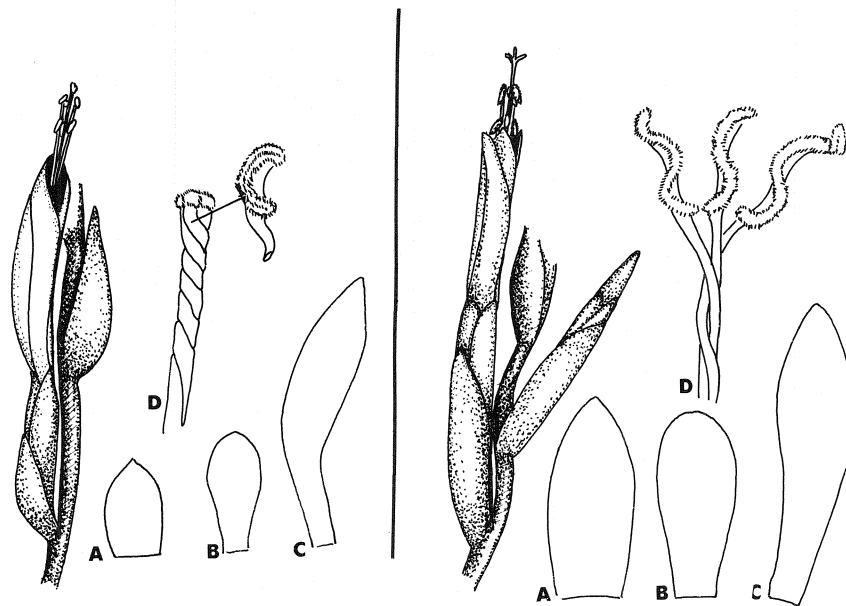


Fig. 6. Distribution of *T. utriculata* subsp. *utriculata* (partial) — circles; *T. utriculata* subsp. *pringlei* — triangles; and *T. karwinskyana* — stars.



Figs. 7-10. SEM photograph of trichomes from abaxial leaf blade of *T. utriculata* subsp. *pringlei* and close up of portion of ventral wing (7 & 8); and *T. karwinskyana* and close up of portion of ventral wing (9 & 10). Bar represents 100 μ m.

*Tillandsia utriculata**Tillandsia karwinskyana*

Figs. 11 & 12. Floral parts of *T. utriculata* and *T. karwinskyana* respectively. A - floral bract; B - sepal; C - petal; D - style apex.

vealed distinctive surface ornamentation on the ventral surface of the wing cells of *T. utriculata* that is lacking on those of *T. karwinskyana* (Figs. 7-10). This characteristic is easily determined under compound light microscopy at magnifications of 100X or greater.

Living, flowering specimens of *T. utriculata* subsp. *utriculata* or subsp. *pringlei* are distinguishable from *T. karwinskyana* by corolla color and conformation. The corolla of *T. karwinskyana* is chartreuse, relatively firm, and actinomorphic, although occasionally slightly irregular. That of *T. utriculata* is thin, creamy white, and the petals twist apically at anthesis forming a lateral aperture and distinct zygomorphy (Figs. 11 & 12).

Tillandsia schiedeana Steud. subsp. *glabrior* (L. B. Smith) C. S. Gardner, comb. et stat. nov.

Basionym: *Tillandsia pueblensis* var. *glabrior* L. B. Smith, Phytologia 6:83, 1958 (Fig. 13).

Type: MEXICO: OAXACA: Tequisistlán, growing on perpendicular rocks, alt. 900-1200 m, 1957, *Foster & Van Hying* 2937 (Holotype: US).

Tillandsia schiedeana var. *totolapensis* Weber & Ehlers, Feddes Repertorium (in press) (Weber, Bull. Bromeliad Soc. 33: 30-33, 1983).

Type: MEXICO: OAXACA: on the road from Oaxaca to Tehuantepec near Totolopán, saxicolous, 1981, *Weber* 472 leg. *Ehlers* (Holotype: HAL, drawing seen).

Additional material examined: MEXICO: OAXACA: Tequisistlán, 1959. *Van Hying* 5944 (US); 1979, *Gardner* 1130 (SEL, US).

Distribution: Oaxaca, Mexico from Tequisistlán to Totolopán.

Although this subspecies is more closely related to *T. schiedeana* than to *T. pueblensis*, it is distinct from the former by several significant characteristics. It occurs in large colonies on canyon walls along the road from Oaxaca to Tehuantepec and is highly adapted to the saxicolous habit, with long descending stolons and upwardly secund leaves. These characteristics are often found in saxicolous species including *T. pueblensis*. *Tillandsia schiedeana* subsp. *schiedeana* is widespread, and occurs from northern Mexico to northern South America. Specimens of this subspecies also occur sympatrically with subsp. *glabrior*. Occasional saxicolous specimens of the typical subspecies occur. However, they do not display modification of the typical spherical clumps of stellate rosettes with straight leaf-blades joining the leaf-sheath at a 90 degree angle.

Similarities in inflorescence characteristics of the two taxa support conspecific classification. Pigmentation of the flowers varies between and within the two subspecies. A larger amount of red pigmentation is typical of the petals of subsp. *glabrior* with one-half to all of the petal lobe red, whereas in samples from six populations of the typical subspecies only a few specimens in each were found to have a small amount of red pigment at the base of the primarily yellow petals.

Tillandsia rotundata (L. B. Smith) C. S. Gardner, stat. nov.

Figure 14

Basionym: *Tillandsia fasciculata* Swartz var. *rotundata* L. B. Smith, Contr. Gray Herbarium 154: 36, pl. 4, figs. 6, 7, 1945.

Type: GUATEMALA: HUEHUETENANGO: Carrizal, 1942, *Steyermark* 50809 (Holotype: F).

Additional material examined: MEXICO: CHIAPAS: Las Casas, 1957, *Foster & VanHynning* 2952 (US); AGUACATENANGO, Venustiano Carranza, 1965, *Raven & Breedlove* 20095 (DS, US); Comitán de Domínguez, 1965, *Breedlove* 9831 (DS, US); Rincón Chamula, 1981, *Gardner* 1410 (SEL); Campo Santiago, S of San Cristóbal de las Casas, 1981, *Gardner* 1419 (SEL); *Gardner* 1086 (SEL, US). GUATEMALA: MORAZON: Río Yeguaré, ca. 14° N, 87° W, 1949, *Williams* 15997 (EAP, F, US). HONDURAS: Morazan, 1964, *Gilmartin* 938 (US); *Gilmartin* 981a (US).

Distribution: Chiapas, Mexico, Guatemala, and Honduras.

Several characteristics distinguish this species from *T. fasciculata* Swartz. The inflorescence is a globose head of densely digitate spikes or branches that are nearly as broad as they are long. The branches of *T. fasciculata* var. *fasciculata* are distinctly lanceolate, and more than three times longer than broad (see Figure 17). The branches of *T. rotundata* are subtended by suborbicular primary bracts. The floral bracts are cucullate, slightly inflated, and nearly as broad as they are long, whereas the width of the floral bracts of several specimens of *T. fasciculata* is approximately one-half the length. The abaxial surfaces of the floral bracts are slick and polished as if lacquered deep red. The surfaces of the floral bracts of *T. fasciculata* are smooth but not polished.

The habitat of *T. rotundata* is typically at higher elevations than *T. fasciculata* although there is some overlap. *Tillandsia rotundata* is reported at between 1400 and 2500 meters, and all varieties of *T. fasciculata* (except var. *rotundata*) occur between sea level and 1880 meters (Smith & Downs, 1977). *Tillandsia rotundata* typically occurs in pine and oak forests.

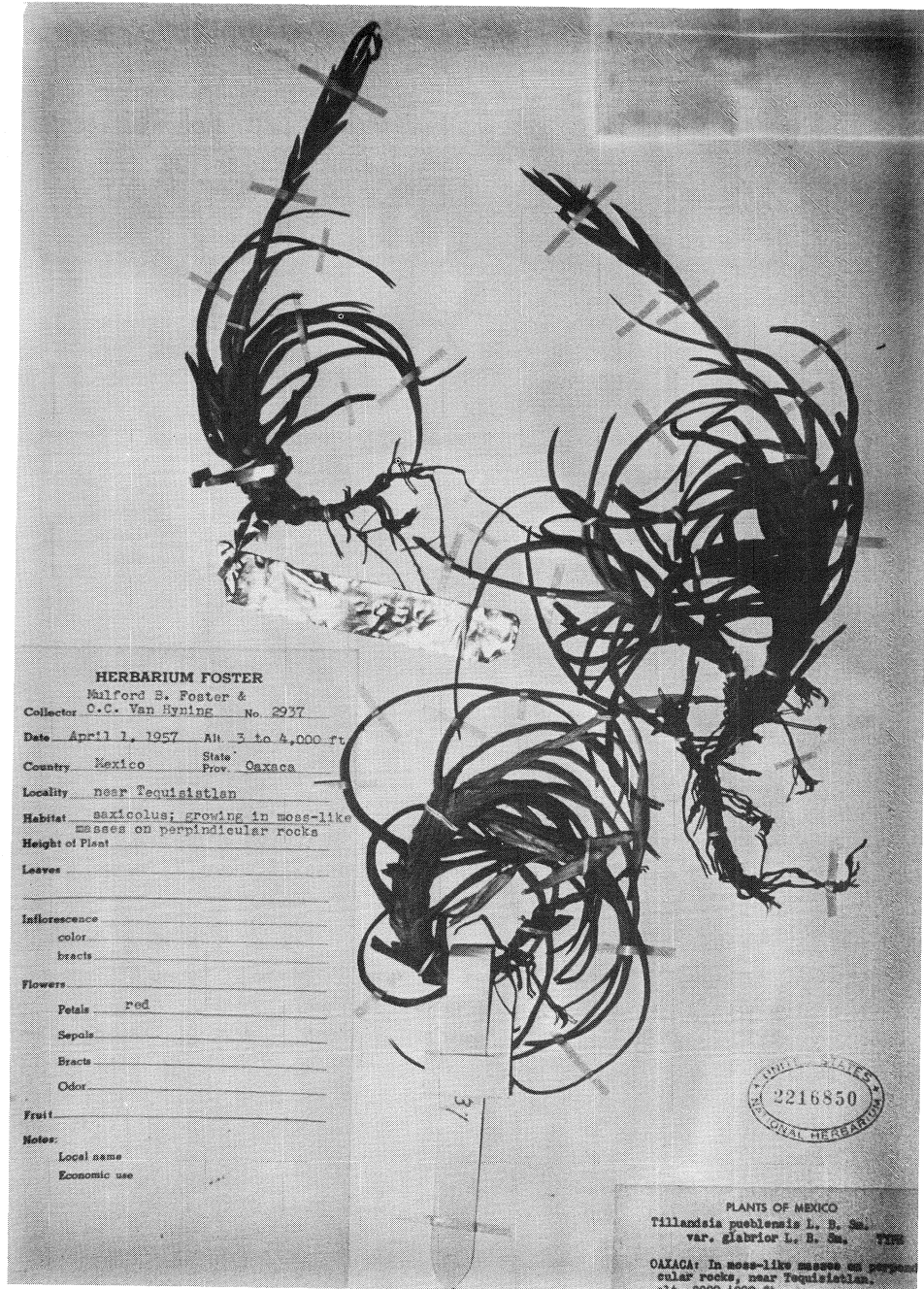


Fig. 13. Foster and Van Hyning 2937, TYPE of *Tillandsia schiedeana* subsp. *glabrior*.



Fig. 14. Steyermark 50809, TYPE of *Tillandsia rotundata*.

Tillandsia × *polita* L. B. Smith pro sp. et stat. nov.

Figure 15

Type: GUATEMALA: EL QUICHE: Quiché to San Pedro Jocopilas, *Standley 62465* (Holotype: F).

Probable parentage: *T. rotundata* (L. B. Smith) C. S. Gardner × *T. rodrigueziana* Mez

Additional material examined: MEXICO: CHIAPAS: Tuxtla to Las Casas, 1957, *Foster & Van Hyning 2951* (US); Teopisca, 1979, *Gardner 1085* (SEL); 1981, *Gardner 1420* (SEL). GUATEMALA: BAJA VERAPAZ: Saloma, 1960, *King 3285* (TEX, US). HONDURAS: Morazán, 1964, *Gilmartin 981b*, (US).

Distribution: Chiapas, Mexico, Guatemala, and Honduras.

Near San Cristóbal de Las Casas, in the highlands of Chiapas, *T. rotundata* apparently hybridizes with *T. rodrigueziana*. Specimens, intermediate between these species occur, and morphological diversity among the putative hybrids suggests backcrosses and/or sibling crosses. Some of these intermediates were found to agree well with *Standley 62465*. The distributions of both putative parent species extend into Guatemala and other specimens examined suggest they hybridize there also.

Pollen infertility (0 to 18%) and the results of statistical analysis of morphological characteristics among the assumed hybrids and their putative parents support the notion of a hybrid origin for this species (Gardner, 1983).

Tillandsia limbata Schlechtendal, Linnaea 18: 419, 1844.

Type: MEXICO: VERACRUZ: Hacienda de las Lagunas, *Schiede s.n.* (HAL, photo seen).

Tillandsia geniculata Baker, Handb. Bromel. 1889.

Type: MEXICO: without exact locality, *Morren Icon* (K, photo seen).

Tillandsia flexuosa auct. non Swartz: J. G. Baker, Handb. Bromel. 1889 and L. B. Smith & R. J. Downs, *Tillandsioideae in Flora Neotropica Monograph No. 14*, 1977.

Tillandsia dasyliirifolia auct. non Baker: W. Weber, *Herbarium Studies II*, Jour. Brom. Soc. 31(5): 222-224, 1981.

Additional material examined: MEXICO: VERACRUZ: Mirador, 1929, *Skwarra 19* (GH); San Louis Potosí: lowland forests, Rascon, 1892, *Pringle 5306* (GH); Xilitla, 1979, *Gardner 835* (SEL) HIDALGO: Huejutla, 1946, *Moore 2219* (GH); PUEBLA: E of Xicotepec de Juárez, 1979, *Gardner 866* (SEL); CHIAPAS: Hwy 195, 35 km S of Tabasco state border, 1981, *Gardner 1399* (SEL). BELIZE: Belize, *O'Neill 8510* (GH); 1970, *Liesner & Dwyer 1415* (GH); 11.5 mi. N of Belize, *Croat 23274* (GH). GUATEMALA: VERAPAZ: Chiquimula, 1885, *Watson 49* (GH); ALTA VERAPAZ: Cerro Chinajo, between Finca Yalpemech and Chinaja above source of Rio San Diego, alt. 150-700 m, 1942, *Steyermark 45690* (GH). IZABAL: Quiriguá, alt. 75-225 m, 1922, *Standley 24228* (GH). PETEN: La Libertad, 1933, *Lundell 2643* (GH); *Lundell 2912* (GH).

Distribution: Moist lowland forests of eastern Mexico, Guatemala, Belize, and eastern Honduras (San Pedro Sula) (fide Luther) to 800 m elevation.

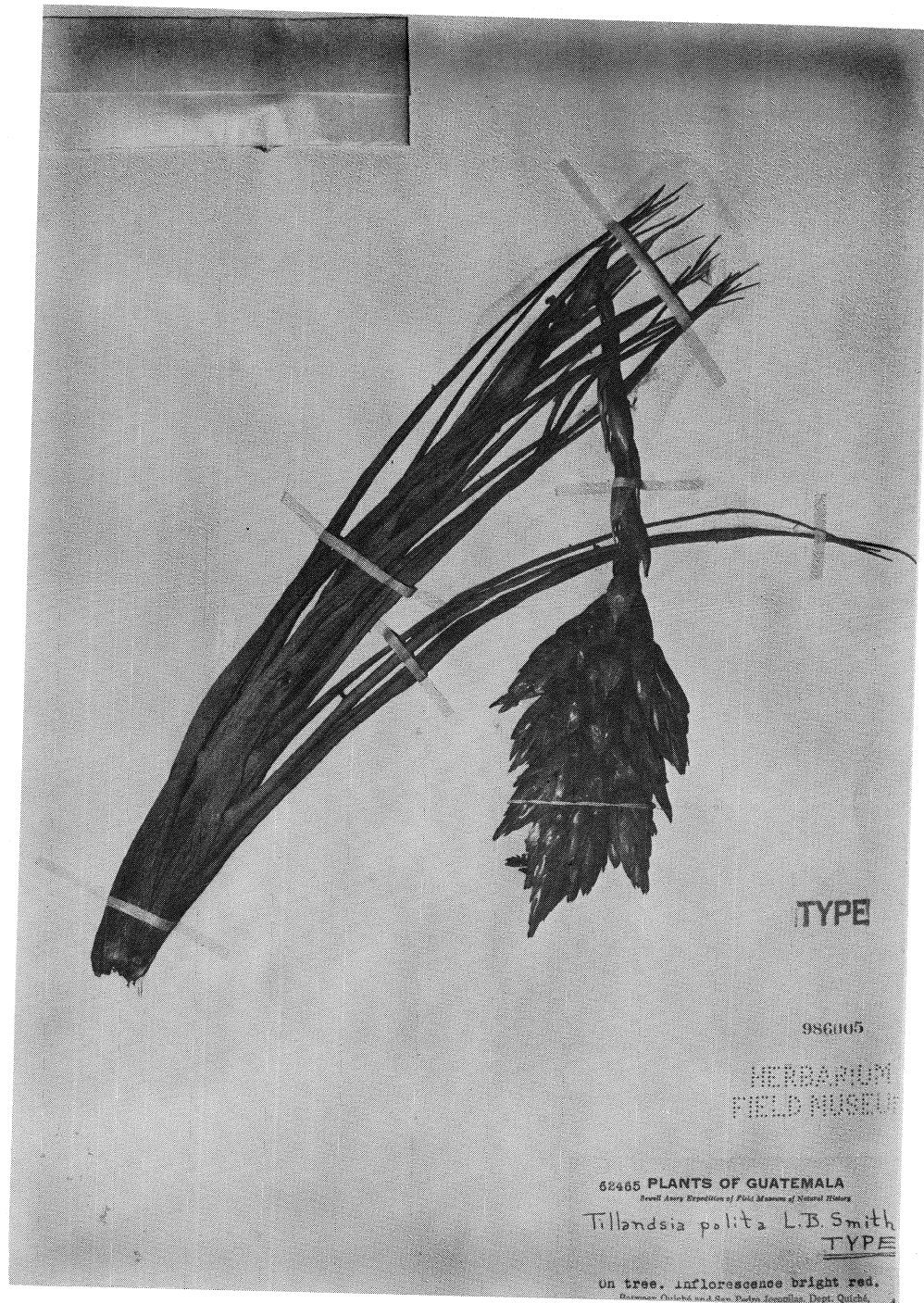


Fig. 15. Standley 62465, TYPE of *Tillandsia* \times *polita*.

Photographs of Schiede's specimen annotated as the type for *T. limbata*, published by Weber (1981), prove that this species is not a synonym for *T. flexuosa*. His placement of *T. dasyliiriifolia* as a synonym of *T. limbata* is apparently based on Mez's citation of the Schiede specimen under *T. dasyliiriifolia* (without mention of *T. limbata*) (Mez, 1935) and assignment of similar specimens to *T. dasyliiriifolia* by Smith and Downs (1977). *Tillandsia limbata* and *T. dasyliiriifolia* are, however, distinct species and are readily distinguished by a full suite of characters. Many of these characters are related to ecology as these species are ecologically separated where their distributions overlap, *T. limbata* being restricted to moist forests of high rainfall and *T. dasyliiriifolia* occurring in arid forests or as an epiphyte on cacti or *Yucca* in deserts.

Baker (1899) described *T. dasyliiriifolia* as having "very thick and rigid leaves" and violet petals. *Tillandsia limbata* has long, arching moderately thin leaves that are slightly coriaceous, at most, and greenish white petals. *Tillandsia dasyliiriifolia* belongs to a species complex that includes *T. makoyana* Baker. This complex displays a mosaic pattern of character combinations and ecologies.

Tillandsia limbata may be distinguished from either of the previous species by the following: floral bracts broadly ovate, enfolding, or nearly enfolding the rachis, quite smooth (fresh or dry), glabrous, never nerved. Floral bracts of *T. dasyliiriifolia* complex specimens are much narrower, not enfolding the rachis (or only slightly) and are typically finely nerved (Fig. 16). Living specimens differ in pigmentation of the scape, rachis, and flush of the floral bracts that is No. 42 maroon in *T. limbata* but No. 38 rose in *T. dasyliiriifolia*.

Tillandsia xerographica Rohweder, *Senckenbergiana* 34: 113, Figs. 8-11, pl. 1, Fig. 2, 1953.

Type: EL SALVADOR: SONSONATE: Los Cobanas, 1951, *Rohweder 157* (Holotype: HBG; photo: US).

Tillandsia krusiana Matuda, *Cact. Suc. Mex.* 19:1, Fig. 15, 1974.

Type: MEXICO: GUERRERO, Rincon de la Via, in oak forest, *Kruse 3118* (MEXU n.v.).

Tillandsia tomasellii DeLuca, Sabato and Balduzzi, *Brittonia* 31:4, Figs. 1 and 2, 1979.

Type: MEXICO: OAXACA: Rio Hondo, Dept. Yautepec on the road to Santo Domingo Tehuantepec, epiphytic on tree trunks along the river, *DeLuca, Sabato & Balduzzii s.n.* (Holotype: NY, Isotypes FI, NAP, PAV n.v.).

Additional material examined: MEXICO: GUERRERO: Rincón de la Via, 1980, *Gardner 1212* (US, SEL); OAXACA: Pochutla, 1981, *Gardner 1446* (US, SEL); 80-85 km W of Tehuantepec, 1958, *MacDougall 402* (US); Río Hondo, 1979, *Gardner 1127* (US, SEL); without exact locality, 1958, *Foster 3029* (US). GUATEMALA: ZACAPA: near Zacapa, 1940, *Standley 74149-A* (F; photo: US); cultivated without exact locality, 1979, *E. Baker s.n.* (SEL).

Specimens collected at the type localities for *T. krusiana* and *T. tomasellii* were compared to cultivated plants of *T. xerographica* collected in Guatemala and with a photograph of *Rohweder 157*. No character distinctions were found to support the maintenance of *T. krusiana* or *T. tomasellii* as separate species (Gardner, 1982). All the specimens examined shared narrow,

laterally flexed claviform branches, polished, nerved floral bracts and lavender petals. The leaves of specimens from Rio Hondo, Oaxaca tend to be less contorted than those of specimens from Guatemala or Rincón de la Via, Guerrero.

Tillandsia compressa Bertero ex Schultes, in Roemer & Schultes, Syst. 7(2): 1210, 1830.

Type: *JAMAICA*: Bertero s.n. (BM or M? n.v.) identified by description.

Tillandsia fasciculata Swartz var. *venosispica* Mez, DC monogr. Phan. 9: 683, 1896. (L. B. Smith & R. J. Downs, 1977).

Type: *PUERTO RICO*: Maricao, 1884, *Sintensis* 473 (Holotype: K; Isotype: US).

Tillandsia flavobracteata Matuda, Cact. Suc. Mex. 20: 4, Figs. 49 and 50, 1975.

Type: *MEXICO*: VERACRUZ: Hidalgotitlan, SE of Venustiano Carranza, *Valdivia Quijano* 875 (MEXU).

Additional material examined: *MEXICO*: CHIAPAS: Zinacantán, Ixtapa, 1966,

Additional material examined: *MEXICO*: CHIAPAS: Zinacantán, Ixtapa, 1966, *Laughlin* 2122 (US); Ocozocoautla, 1979, *Gardner* 1117 (US, SEL). TABASCO: 1963, *Barlow* 30/146 (US); 1961, *King & Soderstrom* 4851 (US); VERACRUZ: Fortín de las Flores to Orizaba, 1980, *Gardner* 1307 (US, SEL). PANAMA: 19?? *DeLeon* P 140 (US). *COSTA RICA*: ALAJUELA: El Coyo-lar, 1924, *Standley* 40076 (US); SAN JOSE: San José, 1924, *Alfaro* 33971 (US). *JAMAICA*: without exact locality, *Masson* s.n. (BM, photo US).

Distribution: Seasonally dry forest of SE Mexico to Costa Rica, and in Jamaica and Puerto Rico in the Caribbean.

Smith and Downs (1977) note that *T. compressa* appears to be a distinct species in Jamaica, and that according to Proctor even has a different flowering season from *T. fasciculata*. In southeastern Mexico it is also distinct, and in one locality near Ocozocoautla, Chiapas, the two species occur in dense sympatric populations, often growing side by side on a single tree branch. At this site *T. compressa* flowers May to July and *T. fasciculata* var. *densispica* July to August. In spite of some apparent hybridization, the majority of the specimens examined in situ could easily be assigned to one species or the other (Gardner, 1982, 1983). *Tillandsia compressa* has a scape up to 1/2 the length of the leaves and a simple spike with large, beaked, yellow floral bracts, to approximately twice the length of the scape. Overall height may reach 75 cm (Fig. 17).

Tillandsia buchii Urban, Repert. Spec. Nov. Regni Veg. 15: 99, 1917. **Figure 18**

Type: *HAITI*: Mont Descouffay, 1901, *Buch* 581 (B; photo US, photo seen).

Additional material examined: *DOMINICAN REPUBLIC*: 1982, *Rauh* 58542

Distribution: *HISPANIOLA*: Haiti and Dominican Republic.

Tillandsia buchii is a small species approximately 24 cm tall, with a broad, simple spike bearing inflated, densely packed floral bracts. *Rauh* 58542 was examined as a recently collected, living specimen at the University of Heidelberg Botanical Gardens, courtesy of Dr. Werner Rauh. The floral bracts were rusty orange. This species was treated as a synonym of *T. fasci-*

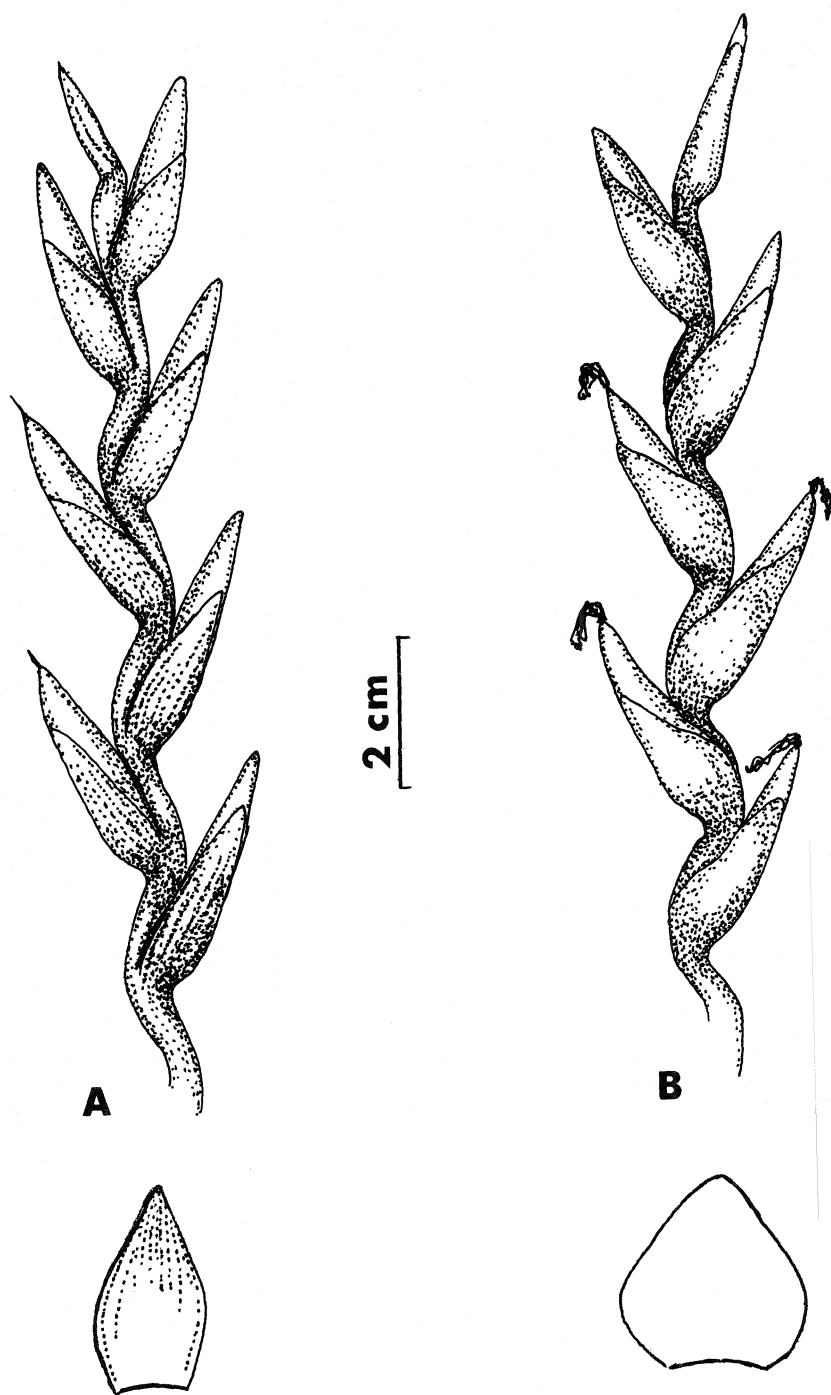


Fig. 16. Portion of inflorescence branch and floral bract of *T. dasylirifolia* (A) and *T. limbata* (B).



Fig. 17. *Tillandsia compressa*, left, and *T. fasciculata* var. *densispica*, right, in Chiapas, Mexico.

culata var. *venospica* by Smith and Downs (1977). However, it appears to be a distinct species, differing by its much smaller size and inflated floral bracts; those of *T. compressa* are strongly complanate and yellow (see *T. compressa* above).

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Fig. 18. Rauh 58542, *Tillandsia buchii* (note standard 4-inch plant tag for scale).

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